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AUTHOR	Gordon, Kenneth F.; Gordon, Barbara, J. A.
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ABSTRACT

During 1967 and 1968, TEMPO, a Research affiliate of The General Electric Company, evaluated federal assistance to local school districts to use for compensatory education authorized by 1965 Elementary Secondary Education Act Title I. The specific research questions were straight-forward: (1) Has statistically significant enhancement of pupil performance resulted to date from Title I compensatory education programs? (2) What school, pupil and environmental characteristics are associated with enhanced pupil performance? The research design analyzed the extra gain, if any, in reading achievement of pupils who received the extra Title I services. The research tasks focused on the collection of achievement test data given both before and after pupils were exposed to compensatory programs and the analysis of the association among these variables. A sample of 11 school districts yielded usable data for 35,000 pupils. A second study allowed further refinement and analysis of the data from the sample schools to pursue answers to the same research questions as in the first study. Even though adjustments for possible negative trends in achievement were made and considerably more detailed cost data on compensatory education treatment were obtained, the previous negative answers to the research questions remained valid. (Author/JM)

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EVALUATION OF THE EFFECTIVENESS OF COMPENSATORY EDUCATION FUNDED BY TITLE I, ESEA[1]

Kenneth F. Gordon*

RMC Research Corporation

and

Barbara J.A. Gordon*

Gordon Associates

The study was conducted in Washington, D.C. by General Electric - TEMPO, which is a part of the General Electric Corporation. Organized in 1956 as a "think tank," TEMPO conducts planning and evaluation studies for other organizational components of GE as well as for state and federal governmental agencies. Its areas of expertise include strategic planning, cost-benefit analysis, technological forecasting, evaluation of social programs, economic analysis/development, and environmental impact studies. At the time of the study, TEMPO had about 300 professionals, including both its Washington office and its Headquarters in Santa Barbara, California.[2]

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*Although a member of the professional staff of TEMPO at the time of this study, Dr. Kenneth Gordon is presently with RMC Research Corporation in Bethesda, Maryland, where he has directed large-scale evaluation and analytical studies in education and other areas. RMC has about 100 professionals and carries out research studies in such areas as education, health, manpower training, economic development, transportation, urban development, and cost analysis. Dr. Barbara Gordon was previously a consultant in education to TEMPO, but is presently head of Gordon Associates, an independent consulting firm specializing in education planning and evaluation.

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INTRODUCTION

During 1967 and 1968, TEMPO, a research affiliate of the General Electric Company, conducted an evaluation of a major federal education assistance program under contract to the U.S. Office of Education. That program, an innovative approach which provided federal grants to local school districts to use for compensatory education, was first authorized by Title I of the Elementary and Secondary Education Act of 1965. After 18 months of program experience, there was a need to evaluate the effectiveness of this assistance approach with the intent of serving as an input to the HEW policy and legislative revision process. At the same time, the government-wide application of the Planning, Programming and Budgeting System (PPBS) was pressing for more analytical evaluations of the outputs produced by federal programs in direct relation to the inputs of those programs. Since this study purposely represented a new approach to help the evaluation (decision-making) process, there was no precedent to utilize for the research design.

The specific research questions adopted for investigation were straight-forward:

1. Has statistically significant enhancement of pupil performance resulted to date from Title I compensatory education programs?

2. What school, pupil and environmental characteristics are associated with enhanced pupil performance (what are the distinguishing features of successful compensatory education programs)?

The research design utilized the extra gain, if any, in reading achievement (as measured on standardized tests) of groups of pupils who received the extra Title I services as the measure of effectiveness of those Title I projects. The research tasks focused on the on-site collection of existing achievement test data given both before and after pupils were exposed to compensatory programs and the analysis of the association among these variables. The project included extensive field work in a sample of 11 school districts to obtain usable pre-and-post test data for 35,000 pupils as well as extensive conversion of that test data to facilitate comparison and aggregation across all the pupils.

A negative answer was obtained to the first question--no clear overall enhancement of pupil test performance was observed over what would have otherwise been expected. This was true even though most educators were saying this federal program was something

great and funding for it should be expanded. Even though no gain was observed, the second question was investigated since it is possible some subgroup or particular program treatment could have been helped significantly even if the overall average was not. Of course, separating out such program effects, which is difficult in any analytical study, becomes a much more frustrating research task in the face of any clear overall trends. Thus, it may not be surprising that, even with the application of several analytical techniques, no pattern of distinguishing features of successful compensatory education programs was identified.

A second study was later funded by the Office of Education to allow further refinement and analysis of the data from the sample schools to pursue answers to the same research questions as in the first study. Even though adjustments for possible negative trends in achievement were made and considerably more detailed cost data on compensatory education treatment were obtained, the previous negative answers to the research questions remained valid.

PART I: BACKGROUND AND POINTS OF EMPHASIS ABOUT THE STUDY

A. CONTEXT OF THE EVALUATION

In 1965, the U.S. Congress initiated a new concept of broad federal assistance to help local school districts raise the performance level of the large groups of students who were consistently falling farther and farther behind their expected educational achievement levels. This program represented a new concept of direct federal involvement in the delivery of educational services by local agencies.

This chapter describes an evaluation carried out by General Electric-TEMPO of the effectiveness of this new federal program after the first 18 months of its operation. It is investigated if the program was successful in "compensating" for the educational deprivation of the target group of students. The contract from the Department of Health, Education, and Welfare entitled, A Survey and Preliminary Cost-Benefit Analysis in Elementary-Secondary Education, resulted in a comprehensive TEMPO report (which is available through the ERIC information system).[3] A second contract followed immediately which further analyzed the survey data and carried out comprehensive case studies of five districts receiving federal funds from this program.[4] Because of its specific emphasis on measuring program effectiveness of a relatively new program, this evaluation effort presented substantial difficulties in analytical methodology and obtaining valid measurement data of student achievement changes for a program already in operation. New evaluation developments were needed since there were no previous studies similar in scope or purpose.

The assistance program being evaluated was established by Title I of the Elementary and Secondary Education Act of 1965 (ESEA) and is commonly known as "Title I." That legislative package (Public Law 89-10), accompanied by the highest appropriations cost for education in history for the nation's schools, was introduced at the "right" time in terms of the climate for passage of such a bill.

The post-war period had several characteristics which encouraged local and state educational agencies to think in terms of federal support for their school systems. First, there was an unprecedented increase in students due to (1) the dramatic increase in the birth rate and (2) the desire of many more persons to remain in school through high school graduation. Second, there was an increasing demand for the schools to take on more

responsibility for improved intellectual and technical education for students; the launching of Sputnik intensified this demand. These factors, plus the Supreme Court decision[5] requiring desegregation of schools in combination with an increased moral concern for the education of economically and educationally disadvantaged children put heretofore unfelt demands on the schools of the United States. Previous to this period, "American Education had been a highly diffused enterprise over most of the course of its history. The role of the Federal government, particularly, had been minimal and any suggested increase in that role had been generally feared and fought."[6]

In the period of the 1950s and 1960s the demands on the financial resources of local and state governments in the field of education began to overcome the fear of federal money being added to school budgets. The largest organization representing professional educators, the National Education Association, was at the forefront of urging federal aid to education. Even though this Association had been on record as favoring federal aid since World War I, its lobbying efforts drastically increased following World War II. These realities and efforts coupled with a more responsive political climate in Washington resulted in federal aid legislation in (1) vocational education,[7] (2) critical, defense related areas,[8] (3) educational research,[9] and (4) aid to the educationally disadvantaged and handicapped child.[10]

ESEA was proposed at a politically feasible time--shortly after President Johnson came to office and developed his War on Poverty. It was in this context that the ESEA was signed into law on April 11, 1965, just 89 days after it was introduced in the Congress. That short period is highly unusual for such major legislation.

Title I was by far the largest financial segment of the ESEA. The funds appropriated for this title have varied from 959 million dollars in Fiscal Year 1966 to almost 2 billion during Fiscal Years 1972 and 1973. Title I had (and still has) as its purpose the provision of federal financial support to Local Education Agencies (LEA) drawing their students from concentrations of low-income families. The Act assumed that a high correlation exists between educational deprivation and low-income. In connection with ESEA, Title I, Congress made this declaration of policy:

> In recognition of the special educational needs of children of low-income families and the impact that concentrations of low-income families have on the ability of local education agencies to support adequate educational programs, the Congress hereby

declares it to be the policy of the United States to provide financial assistance to local educational agencies serving areas with concentrations of children from low-income families to expand and improve their educational programs by various means which contribute particularly to meeting the educational needs of educationally deprived children.[11]

ESEA was enacted so quickly that many LEAs were caught totally off guard. Most of the initial ESEA Title I programs did not result from an analysis of the needs or accurate, objective definition of the educationally deprived at the LEA level. ESEA Title I monies were received by all states and three-fourths of the LEAs. The poverty indicators were specified in the Act as:

- Children aged 5 through 17 in families with an annual income below $2,000, according to the 1960 census, and

- Children in the same age group from families with an annual income above $2,000 who receive Aid to Families with Dependent Children (AFDC).

The total of the children in the eligible categories was multiplied by one-half of the State per pupil expenditure to compute allocations. The state education agency administers the program and suballocates funds to projects proposed by eligible local education agencies. Although projects are to be submitted for approval from the local district to the state agency, in reality few proposals are rejected. In the first few years of Title I, more than one-third of the total expenditures were utilized for reading projects. Among the other projects often funded were those in such areas as library, guidance and counseling, and instructional programs such as mathematics.[12]

Each local district is supposed to utilize program funds only in areas with high concentrations of children from low-income families and in those areas, funds are earmarked to meet the special educational needs of the educationally deprived. In the beginning years of ESEA, much confusion resulted from attempts to pinpoint eligible recipients of this aid.

The basic purpose of compensatory education (provided by Title I, ESEA or other programs) was to close the "gap" in the educational achievement of certain student groups, a performance gap which gets wider as time progresses, if conditions don't change. The education gap between pupils attending schools eligible for Title I assistance and non-Title I schools is

significant and critical. For example, the statistical distribution of test scores for reading (or any other particular student skill) in a certain grade in a Title I school typically stands well to the left of the corresponding distribution taken from the overall national picture, as indicated by Figure 1. The amount of difference varies, of course, but, in general, fourth grade pupils in Title I schools lag about one year behind national achievement levels. A longer-term consequence of this problem is illustrated by Figure 2. The norm-achieving pupil achieves at the rate of 1.0 grade units of academic progress for each school year. The typical disadvantaged pupil progresses at a rate equal to only 65-75 percent of the norm. Thus, after 12 years, a disadvantaged pupil can be as much as four years behind, if he is still in school. One of the goals of compensatory education (CE) is to improve the achievement rate of these disadvantaged pupils and thus lessen the gap between them and the national norm. As noted below, the nature of these educational needs underlying compensatory education had significant effects on the evaluation design and process of this study.

Publication of the Coleman report, Equality of Educational Opportunity,[13] has led to two common misconceptions among educators and the general public regarding the relationship of the report to Title I ESEA. The first of these is the assumption that the generally negative results of the Coleman Report is proof that compensatory education cannot be expected to work and the second is that ESEA legislation actually was the outcome of the Coleman study. Note that these are divergent viewpoints. To dispell misconceptions about the second item, it is only necessary to note that the PL 89-10 ESEA Bill was introduced into the U.S. Congress in January 1965 and was passed on April 11, 1965. The Coleman Report was a study done in response to the Civil Rights Act of 1964[14] and was not published until July 1966.

On the first point, although the Coleman Report did indicate that, using existing educational practices, there was little evidence to indicate that additional spending is an important factor in improved school achievement, it did not evaluate situations in which Title I money was being utilized.

The Coleman study also pointed out a reality of educational evaluation brought home by the present study--the difficulty of measurement. In commenting on the lack of information in LEAs on which to evaluate or gauge needs, the Coleman Report indicated that "one of the real handicaps to an effective assessment of equality of education for children of minority groups (or any children) is the fact that few communities have given systematic

Figure 1. Typical education gap found between Title 1 fourth-grade classes and the national norm.

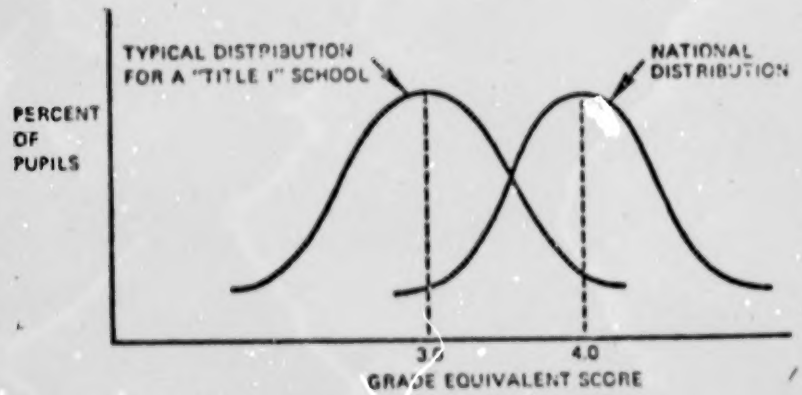
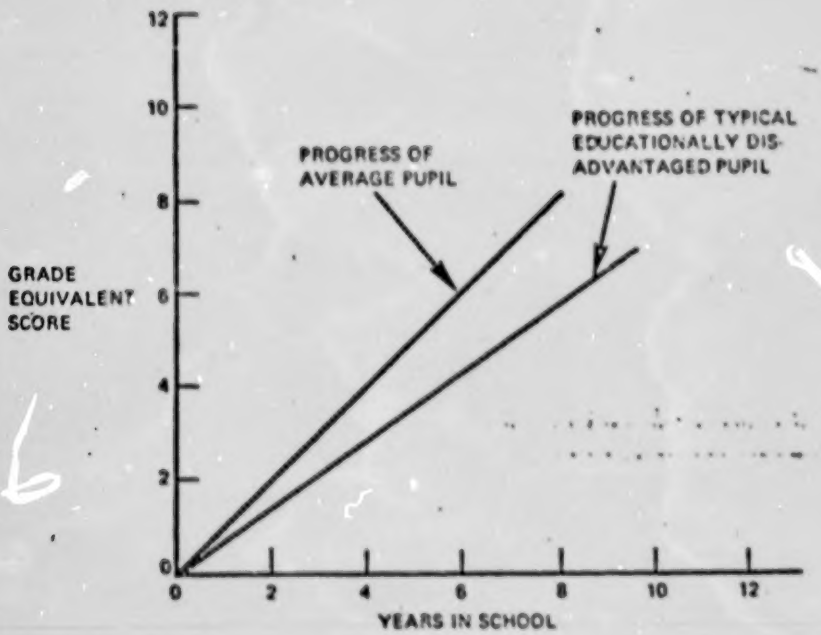


Figure 2. Education gap between national average and disadvantaged pupils.



testing and fewer have evaluated the academic performance and and attitudes of these children toward education."[15]

B. POLICY BACKGROUND

At the time this study was initiated by DHEW, several important policy questions were taking shape. The analytical examination this project provided was considered one important contribution to answering those policy questions. The overall issue was: "Now that this innovative program has been operating for over a year, what have been its effects on students, in relation to the inputs." Criticism had already been voiced (from both inside and outside the educational community) that Title I was not achieving its objectives, was primarily serving as general aid to local education from the federal sector, and was not reaching the intended target group.

While the regular procedures of the states, the General Accounting Office, and the Office of Education were monitoring how Title I funds were allocated and spent, the question of effectiveness and impacts on students required special measurement of achievement and analysis of inputs to outputs. Up to that time the Office of Education had not addressed this sort of question and was not in a position to obtain or analyze that type of student achievement and program cost data. However, increasing concern was being voiced by legislators and other policy groups about what they were getting for their money, and how they could change the program or projects to increase effectiveness.

There were three main ways that DHEW and OE could take (or recommend) action in the policy area to move events toward desired ends. In fact, these are areas where the agencies are obligated to periodically review and recommend the necessary actions, and they were seeking helpful inputs to that process.[16]

(1) Allocation of Future Funds. Title I funds could be allocated differently next year by OE to the states and LEAs. Both the overall level and the relative distribution of funds could be modified, although the ESEA legislation contained certain allocation constraints which had to be followed.

(2) Revision of Title I Guidelines. Since OE prepared the detailed procedures and published guidelines for implementation of Title I, needed modifications could be made. These guidelines govern the procedures by which LEAs apply for Title I funds, how

eligibility is defined, what local activities can be supported by Title I funds, and what evaluation actions are required of LEAs.

(3) Recommendation of New Legislation. Based on the experience of the first year or two with Title I, DHEW could recommend modifications to ESEA it believed necessary or desirable. Since ESEA had been a new approach, many Congressmen were particularly receptive to assessing its early impact and making needed changes (several packages of amendments were actually enacted over a several year period).

The existence of these policy needs coincided with the emerging desire to try better evaluation approaches focusing on the effects or outputs produced by specific federal programs. The TEMPO evaluation contract being described was one result of the combination of these forces.

C. THE PROCUREMENT PROCESS

The procurement process for this study did not follow the usual Request for Proposal (RFP) process that HEW has commonly used in recent years. It resulted from a longer term development process by TEMPO and the changing interests (and people) within HEW.

It is important to understand the situation within HEW and USOE at the time this study was initiated. Historically, neither evaluation nor its use in the resource allocation process had been very frequent or intense. During 1965-66, a fresh attempt to improve decision-making was occurring in several civilian departments, including HEW. The stimulus was provided by the apparent success in bringing structure and quantitative analysis to the military planning process in the Department of Defense (DOD) during the early 1960s. Evaluation of program outcomes and effectiveness was a major cornerstone of the process of program budgeting and systematic allocation of resources across programs. Under the banner of a Planning, Programming and Budgeting System (PPBS), all federal government agencies were instructed by executive order of President Johnson in August 1965 to adopt similar principles and procedures as had been developed in the Defense Department. (Many of the directors and key staff of the planning or analysis groups within HEW and USOE at the time of this study were former members of the Defense Department or its contractors.)

During that same time period, TEMPO had similar objectives. Several key TEMPO staff had worked with DOD and also were interested in applying the same approaches to problems of the civilian agencies. TEMPO was in the business of carrying out such research and planning studies and additional contract activity would aid in its growth. One of its organizational objectives was to diversify from its past dependence on contract work in defense strategic planning and military analysis.

USOE and TEMPO's interest coincided in December 1965 when HEW solicited letters of interest from R & D organizations via an announcement in the "Commerce Daily Bulletin" (December 25, 1965) to carry out the following actions:

(1) Provide a framework for systematically ordering, relating and integrating educational goals, programs, and program elements.

(2) Permit systematic identification and analysis of alternative educational goals and programs, and their short and long term requirements and effects (in terms of cost-benefit factors and economic criteria appropriate to policy decision).

(3) Provide a basis for systematically identifying information requirements for educational planning, programming, and evaluation activities (of USOE).

(4) Permit continuing evaluations of progress in meeting approved goals.

As these points show, the request was structured in the framework of program budgeting and providing help to the policy maker in ordering priorities, allocating resources, and evaluating impacts.

TEMPO submitted an expression of interest and a brief description of its capabilities at that time. Informal discussions were periodically held with HEW-USOE officials over the next few months whenever the opportunity presented itself. No studies resulted from this activity in the short run. In March of 1967, with the encouragement of HEW-USOE staff, TEMPO submitted an unsolicited proposal to USOE to conduct "A Survey and Preliminary Cost-Benefit Analysis in Elementary and Secondary Education" (TEMPO No. T-07402). The proposal was prepared completely by the senior staff of TEMPO's Washington office, primarily based on their experience in assisting government decision-makers in program budgeting, rather than experience in the field of local education. The unsolicited proposal outlined

study objectives and project activities but the development of most of the analytical approach and research design was deferred until the actual study. It was considered an exploratory study, i.e., a test of what a systematic analysis of this type would produce when applied to the field of education. Even so, it was assumed that the results of this study would help with major funding and program decisions that had to be made in the Fall and Winter of 1967.

In April, 1967, Contract HEW-OS-67-55 was awarded to TEMPO to perform this study. The project office for technical guidance and monitoring was specified as the Program Analysis Group at the HEW level rather than within USOE itself.[17] A letter to the chief of the HEW Procurement Section on April 20, 1967, to justify the award of the research grant to TEMPO stated that "USOE had decided to transfer funds to the Office of the Secretary, DHEW" for the proposed project. The contract was for approximately $175,000 (on a cost-plus-fixed-fee basis). The second contract that followed in 1968 was for approximately $100,000.

D. WORKING RELATIONSHIPS

Working relationships between the contractor and the client were fairly effective. The main contact was with the HEW Program Analysis Office where the contract was issued and where the contract technical monitor was located. The monitor maintained relatively close monitoring and coordination of the work progress. TEMPO sought to maintain this involvement throughout the study, partly because of the evolutionary nature of the research task. For example, during almost all field visits to school districts for data collection, TEMPO sought and obtained joint participation from either HEW or OE personnel. In most cases this was extremely beneficial since the otherwise limited opportunities for travel to the field made it difficult for HEW and OE staffs to have a good understanding of the Title I activities being carried out at the local level. The location of all TEMPO project staff in Washington, D. C., made it much easier to meet often with various monitoring staff members and to keep them involved in both the development of the technical approach and the data collection problems.

Although the primary person responsible for monitoring this contract in HEW changed during the life of the complete project, no difficulties resulted from this action. When the director of the Program Analysis Group at HEW left to become president of the newly formed Urban Insitute, his deputy took over his position and also continued to maintain technical coordination with this

contract. At a later point another senior staff member assumed major responsibility for monitoring the final phases of the initial contract and continued through the extensive investigation of five districts during the second contract.

The Title I Program Office within OE had involvement in the field stage with the project since its staff members participated in the joint field data collection teams. The central research and evaluation group at the Office of Education level was essentially uninvolved also although it is assumed they kept informed of the research progress at the same time they were pursuing their own research objectives. When the project was completed, briefings on the results were given to representatives of these and other observed on the part of the staff of the OE Program Office administering Title I. This group established guidelines and monitored the Title I programs at the state and local levels, and did not appear to feel threatened by this outside evaluation of the program they were administering.[18]

The other major group whose cooperation was needed was the officials of the school districts being examined. With few exceptions, these relationships worked out well and adequate cooperation was received during the data collection process. This may have occurred for three major reasons:

(1) advance concern for this problem was evidenced by TEMPO and OE, including particular care with advance preparations for field visits, e.g., courtesy calls to superintendents and state educational agencies,

(2) almost all data collection was don on-site by TEMPO and OE staff, thus minimizing the amount of extra work and confusion on the part of local staff, and

(3) this was one of the first federal evaluations of ESEA (LEA administrators may have felt different later when several evaluations were underway).

Relationships were nearly always very cordial between the on-site team and the LEA staff, once the personal, face-to-face stage was reached. In some cases, the local staff went considerably out of their way to provide supplemental data requested by TEMPO at a later point of time. Hostility or lack of cooperation was encountered in only two or three school districts of the original sample. These districts were dropped from the sample at an early point since it was apparent the necessary data would not likely be obtainable within the short time available. In many cases,

middle-level local staff were extremely helpful and receptive since they were enthusiastic at the prospect of having outside professionals interested in their data and their problems.

Some difficulties were encountered with the initial allocation of both time and money for this study. For one thing, a very optimistic schedule was initially established (the final report within six months). With the approval of HEW, the final report was actually submitted in March of 1968 (a total duration of 11 months). The major contributing factor was the considerable effort required by the joint teams in obtaining the necessary achievement data from local districts. Also contributing to the longer schedule was the large amount of data processing necessary to convert the individual student test scores to a common standard and to statistically analyze the large amounts of data. Even after the final report was completed for the original study, there were several additional questions and data refinements that were mutually considered worth investigating. A second phase study was designed and funded by OE to do further in-depth work with five districts of the original sample.

Due primarily to the expanded schedule, the original funding level was extremely tight and this was a continuing constraint on the scope of TEMPO's activities. The second phase was completed within the funding levels and time established for it. In interpreting the sufficiency of both time and money for this study, it should be remembered that there was considerable uncertainty about the specific technical approach when the original estimates were made. That, of course, is why it was thought of as a research study and why the funding level was established under a cost reimbursement arrangement. There was a considerable amount of exploratory work involved and OE and TEMPO mutually agreed to several revisions to the technical approach during the life of the project. In retrospect, it is probably not reasonable to expect that the time and money required could have been accurately estimated prior to the study since the analytical approach had not been used before on that scale and because the staff involved (in both HEW and TEMPO) were new to educational evaluation.

E. UNIQUE ASPECTS OF THE STUDY

There are several points about this study that are worth special mention. To begin with, a group of unique characteristics of the technical approach differentiate it from many other studies. At the time this study was initiated, it was not common in the field of education to specifically investigate effectiveness of

education (that is, to compare the performance and value of outputs to the specific inputs of the process). Most national educational or psychological studies previous to this time were descriptive in nature and focused on the educational process itself rather than the output product of that process. Title I ESEA was a new approach, an attempt to compensate for educational disadvantagement via added federal financial assistance. As a result of these factors, TEMPO had no national educational precedent to follow in designing the technical approach and evaluating this educational program. But, as previously described, it was also true that initiation of this particular study and its award to an analytical study group like TEMPO was a direct reflection of the desire of several HEW officials to bring new objectivity to the evaluation task. They wanted a comprehensive analytical look at the problems involved to help educational planners at the federal level make decisions, and they focused on compensatory educational for the disadvantaged as the initial application area. Reflecting the beliefs of several key HEW program analysis staff members, the approaches successfully used for planning, programming, and budgeting in the Defense Department were applied to seek understanding of the impacts of large-scale federal programs in education.

Another unique aspect of the technical approach centered around the need for large scale comparative achievement testing of the pupils. Because there was neither time nor money to administer student achievement tests, TEMPO had to depend on tests already given by the school districts. This, of course, meant that cooperation of the LEAs was needed in identifying and making available pre- and post-test data on their Title I pupils. It also precluded use of a random sample. Moreover, it was necessary to make personal field visits to the sample districts to obtain student test scores and other data. The necessity for using achievement test results which were available created great difficulty in making comparisons across districts. Even though TEMPO used extensive statistical and data processing procedures in standardizing test data to enable cross comparisons, this did not eliminate the lack of comparability as a source of potential error. The tests were just not designed or normed by their publishers to be comparable to each other. This difficulty of obtaining achievement data on individual students over successive time periods required comparing the performance of a whole grade in a school (fixed grade approach) rather than the performance of individual students over time (the longitudinal approach).[19] Although the longitudinal approach would have been preferable since it eliminates several outside sources of variation, it would have required the retrospective tracing of individual students from grade to grade (and perhaps their migration to other schools). It also would have required

school districts to provide test data to TEMPO by student name rather than the statistical summary by grade which most school districts had available (some cited confidential concerns for not providing student names). Up to that point in time, few if any evaluation studies had been done that required such large scale and comparative use of test data. Student achievement tests were developed and normally used only for individual diagnostic purposes or comparison of group progress within the same school or district.[20]

The second major group of points to emphasize about the TEMPO study concerns the logistics management and work force. The study was completely carried out by staff members of TEMPO, all located in the Washington office. There was no sub-contracting other organizations. The staff was composed of professionals in such analytical areas as economics, mathematics, statistics, and operations research, but there were no professional educators on the full time staff (five senior staff held Ph.D.s). Two psychologists were involved full time during certain phases of the study. Experts in such areas as psychological testing were used as consultants for short time periods. During the conduct of the study, this composition of the project staff was considered satisfactory by both TEMPO and HEW. In retrospect, some additional involvement of specialists may have been beneficial, particularly during the conversion and interpretation of achievement test data. Of course, the composition of the project team at TEMPO reflected fairly directly the philosophy of HEW in initiating this study.

The logistics and field work necessitated by the requirement for field collection of large amounts of data had a great effect on several tasks of the study. The need to have cooperative LEAs that would make the necessary data available had an effect on the sample selection process and eventually required a reduction in the desired sample size (and later the dropping of three districts which did not make the right test data available in time). TEMPO also found that it could not depend on school district budget and planning information to determine the exposure of students to compensatory education. Field observation and study found that data concerning actual teacher assignments and remedial activities were needed, particularly regarding what Title I program activities were actually carried out (i.e., it was not sufficient to depend on the planned activities as described in the district's applications for Title I funds.

Even though the extensive field data collection effort created the difficulties described, it had several beneficial aspects. Undoubtedly, better data resulted from the personal on-site efforts of TEMPO staff. The specific data needs could

be described to LEA staff better and questions answered on the spot. The face-to-face relationship thus established almost always produced better cooperation and happier school district staff. In many cases, TEMPO staff did the necessary clerical work to extract needed data at the district offices. (The alternative would have been to have LEA staff fill out a data collection form and return it by mail). In some cases, TEMPO staff collected or estimated original resource data that would not have otherwise been available to the district. In addition, the on-the-spot observations of operating Title I activities improved the interpretation of the results of data analysis. The personal on-site collection of data also increased the response rate considerably.

F. KEY FINDINGS

The key findings of the TEMPO study are summarized here. In a descriptive sense, TEMPO's on-site examination and subsequent analysis of Title I activities found:

(1) a very wide variety of compensatory education activities being conducted with Title I funds;

(2) compensatory education activities spread thinly over a large number of students;

(3) considerable confusion and vagueness among school officials on the objectives and allowed activities of Title I; and

(4) considerable difficulties and dilution of impact due to bad timing, e.g., Title I funds were received very late and future funding was uncertain (many school planning decisions were already made before Title I resources were defined or available).

The results of TEMPO's analytical approach and data analysis were as follows:

(1) No statistically significant enhancement in student achievement was found over the first 1½ years of Title I activities based on pre- and post-tests for about 25,000 students (in fact, a slight decline was observed in mean performance).

(2) Some separate favorable situations were encountered and available longitudinal data in one school district revealed significant enhancement.

(3) Separate analysis of variance calculations utilizing several characteristics of the LEA, students, and Title I activities (including per-pupil expenditures) revealed no consistent pattern of associations that would explain the lack of overall enhancement.

(4) Subsequent adjustment of performance data for past trends of the schools and added analysis of applied Title I resources at the grade level during the second contract did not modi- by these findings appreciably.

In summary, TEMPO could not show any effectiveness (impact) on student achievement levels from the first 1½ years of Title I programs, even though local educators said the additional money was useful and larger amounts were needed.

G. IMPACT OF THE STUDY

It is difficult to assess the specific impacts TEMPO's lack of positive results about Title I programs had on federal policy makers. Some people were already critical of Title I and readily accepted the generally negative findings. Most educators doubted the results. They basically had faith that all the extra effort and money of Title I had to help the students in some way. While TEMPO's completed study added fuel to existing disagreements on the value of federal education assistance initiated by Title I, it clearly did not settle the issue.

Possibly, Title I was effective and the study just didn't pick that up--TEMPO readily admitted this possibility existed. There were several very good reasons why the lack of strong positive achievement gains could be rationalized or explained away by someone inclined to continue supporting compensatory education. To name a few:

(1) The sample utilized by TEMPO could be construed as non-representative because of the needs for school district cooperation and extensive data collection.

(2) Title I represented a very new program and concept; it was too soon to expect any significant student achievement gains to show up.

(3) Standardized achievement tests may not be adequate measures of student progress, particularly for the highly disadvantaged students which were the target of Title I programs.

(4) The inability to separately identify and measure progress of individual students receiving significant amounts of compensatory education help (thus requiring consideration of that grade as a whole), may have led to masking of achievement gains.

Given the findings of TEMPO's study, what impact on the policy-maker should the evaluator expect? Surely it's not reasonable to expect him to completely drop a new federal assistance concept that is just getting off the ground. Neither the quantitative nor qualitative evidence of this exploratory study was strong enough or clear-cut enough to justify that action or to overcome the strong support from the educational community to sustain widespread financial aid to Title 1.

But what the negative results of the study should have done was to raise caution and sound warnings that maybe this new program was not fulfilling its major objective of improving the educational progress rate of disadvantaged students above established levels. Certainly these results should have precipitated the further testing of the hypotheses implied by the TEMPO study. Remember, at the time the TEMPO study was completed, its lack of affirmative support of the effectiveness of compensatory education was counter to the prevailing opinion in the educational community. Therefore, it is not reasonable to insist (or to expect) a government policy-maker to suddenly desert the concepts and procedures of Title I, especially when no alternative federal assistance for the disadvantaged was available (unless the recommendation of some policy-makers was accepted that Title I be used as a Vehicle for the federal government to provide general educational aid to local school districts). However, it is reasonable to expect federal policy-makers to refine federal guidelines and procedures for Title I (within the framework of existing legislation/objectives) in an attempt to increase the program's effectiveness.

Several of these expected results did occur. There was no tendency to curtail Title I funding in the aftermath of the negative results of the initial study. Of course, the second full year of Title I activities was already underway by the time TEMPO's final report was published. Even for the second year (and even more so for the third year of Title I), the application procedures and federal guidelines for Title I were refined in several ways. Efforts were undertaken to get funding out earlier

and to provide advance indication of anticipated funding. At one point during later years of Title I, a two-year funding authorization was obtained from Congress (an unusual occurrence in itself). In light of observations on the low concentration of resources per pupil (both from the TEMPO study and other observations), efforts were made to ensure the concentration of available Title I resources on a smaller number of disadvantaged students. For example, California recognized the importance of concentration of expenditures in 1967-68.[21] It's annual report indicated "the evaluative results suggest for optimum effectiveness the average student expenditure must be--$300 over and above the regular school program." This recommendation became part of the Title I regulations for California in 1969-70, therefore, requiring further concentration of Title I monies for the disadvantaged.[22] HEW also tightened and enforced regulations so as to ensure that Title I resources went only to qualified schools and that compensatory education resources were not used as a substitute for regular expenditures by the school district.

Subsequent to the TEMPO study, the U. S. Office of Education also moved to collect more evidence and carry out more evaluation on the effectiveness of compensatory education. Large scale evaluations utilizing reading achievement test scores were conducted for the 1967-68 and 1968-69 school years. They used data collected from a large mail survey of a random sample of schools from the newly initiated Belmont joint federal-state educational information system. The 1967-68 evaluation effort[23] was based on the selection of a nationally representative sample of pupils in grades 2, 4, and 6. However, the report indicated that scores on non-parallel pre-program and post-program tests were reported for only 25,103 pupils, and analyzable scores on parallel pre- and post-tests were reported for 11,490 pupils, approximately 9 percent of the returned pupil questionnaires. Despite the sparseness and non-representativeness of the achievement data, some conclusions regarding the compensatory reading programs were given:[24]

(1) Schools selected those pupils with low scores on reading to participate in compensatory reading programs.

(2) Where data collection allowed comparisons between students who participated in specific Title I programs with those who did not participate, the conclusions were:

a. For both groups, their progress in reading skills was similar to their past progress. Therefore, the Title I students never

progressed fast enough to catch up to their non-Title I classmates.

b. Reading achievement for both Title I program students and for non-participating students grew steadily worse at each succeeding grade level sampled.

Many times the results of educational evaluation may not cause a change in policy immediately - as the researcher could find desirable. However, many recommendations of the TEMPO study have been considered and urged for adoption during the subsequent years. For example, higher spending per pupil with its accompanying concentration on those most in need has much support. The January 1974 Presidential message on education has strongly urged advanced funding to enable better local planning and staffing of assistance projects. At the same time, there have been few recommendations for cooperation from the three groups which should be working cooperatively to help the economically and educationally disadvantaged child. The health, welfare and educational policy-makers, administrators and workers should be cooperatively building on each other's efforts to look at the total problem.

PART II: THE STUDY

A. SUMMARY PROCEDURES

This study was undertaken in April of 1967 as one of the major national means of evaluating compensatory education project grants awarded under Title I of the Elementary and Secondary Education Act of 1965. The two major objectives of this study were:

1. to determine whether statistically significant enhancement of pupil performance had occurred within the Title I schools after the implementation of Title I programs, and

2. to determine what characteristics of the pupils, the schools, and the compensatory programs were associated with changes in pupil performance.

Both TEMPO and HEW felt that the answers to these questions would be useful in determining and explaining the success or lack of success of these new programs and would influence the future design of compensatory education projects. Such information also would be needed for policy guidance for both HEW and the Congress.

Title I funds were spread over many cities, schools and pupils. There were approximately 9 million students participating in these projects during FY 1967. It was impossible to study this entire population. The varied nature and short duration of the Title I projects at the time of the evaluation also meant that information available at the state and federal levels was limited. This led to the need for on-site field evaluation and data collection in a sample of Title I schools. Factors considered in the selection of the sample school districts were:

1. geographical and size dispersion
2. urban versus nonurban
3. data availability
4. cooperation of school personnel, and
5. expectations of successful programs.[25]

The last item, "expectations of successful programs," was included since it was anticipated that after only one year of Title I exposure there might be some difficulty in finding measurable evidence of pupil progress. Therefore, HEW personnel helped select sample school districts considered most likely to show signs of progress. Initially fourteen school districts throughout the country were considered as sample candidates and visited. Of these, three did not have sufficient data for analysis, and thus the final sample was reduced to 11 school districts.

Within each school district, a subsample of Title I schools was chosen with the assistance of local administrators. This local subsample included varying values for each of the following characteristics:

1. Pupil attributes
   a. educational deprivation
   b. economic deprivation
   c. mobility
2. School attributes
   a. enrollment
   b. racial student mix
   c. attendance rates
3. Compensatory Education program attributes
   a. magnitude of prior compensatory education programs
   b. intensity of current compensatory education programs[26]

The final sample included 132 schools containing 118,000 pupils from which pre- and post-test scores of 34,000 pupils were obtained and analyzed.

Joint TEMPO and HEW field teams conducted on-site searches within school districts for the necessary data to conduct analyses. The desired data related to pupil performance, school, and pupil characteristics, and those describing expenditures for Title I programs. Reading performance was chosen as the primary indicator of pupil achievement because it is a skill in which the disadvantaged are most noticeably deficient and because it was known that

many school districts had implemented some form of reading improvement program as a part of their Title I efforts.

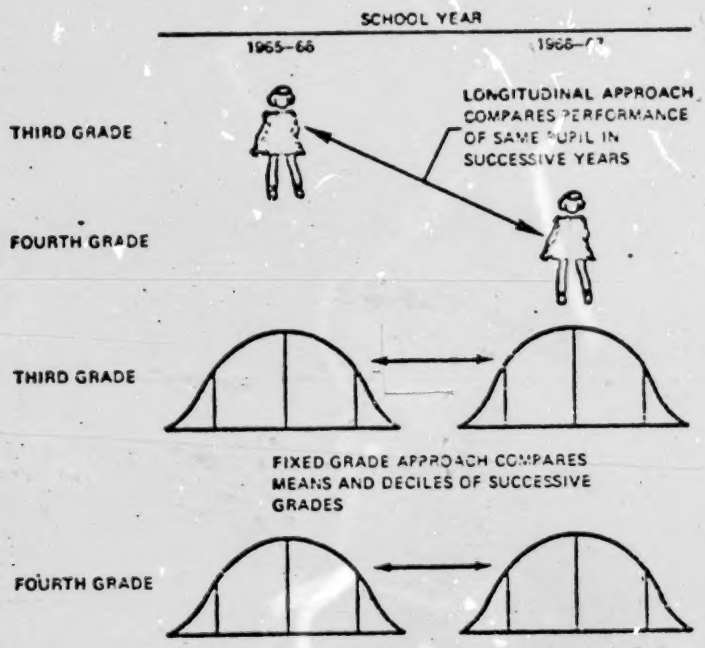
Attendance and dropout rates were included to test the hypothesis that special compensatory projects might increase attendance and reduce dropout rates and, hence, contribute to performance gains. School and pupil characteristics were thought to have potential importance with respect to pupil achievement changes and, likewise, it was natural to look for relationships between pupil performance and Title I expenditures per pupil.

Two methods were used to evaluate achievement enhancement: the "longitudinal," or "individual," method and the "fixed-grade" method. Both of these focused on actual changes from a pre-test and post-test situation. A third method of analysis utilized some standard statistical methods to investigate the existence and validity of relationships between observed changes in achievement and pupil, school, and program characteristics.

In the longitudinal method (see Figure 3) an individual pupil's test score before exposure to Title I programs is compared with his score after exposure to these CE activities. This progress can then be compared to normal rates of increase or the achievement gains that would be expected without special programs. However, this method requires that comparable tests be given to the same pupil in successive years, and this had not been done in most of the sample districts. Furthermore, the test data for each year must be identifiable for individual pupils, but in reality much of it was available to TEMPO only in terms of the distribution of the class as a whole.

In the fixed-grade approach (Figure 3) a specific grade and school is defined as a unit and the performance of the pupils in that unit is compared in two successive years. That is, the different performance levels of, say, the fourth grade in a certain school that had received compensatory education are compared with the performance levels of the fourth grade in the same school for the previous year when no compensatory education was received. This was an important method of evaluation for the first two years of Title I, since the previous year's class could serve as a control or comparison group. Although some specialized remedial programs under Title I concentrated on only a small part of a particular class, thereby ruling out the fixed-grade type of analysis, many other Title I programs such as teacher aides, guidance counselors, and lowered class size affected all members of a particular class or an entire school. Since most of the funding was spent on general programs

Figure 3. Comparison of fixed-grade and longitudinal evaluation approaches.



Source: Gordon, K. F., Gordon, B., Frola, R.; Evaluation of Title I ESEA Compensatory Education; March 1971 71 TMP 23, General Electric TEMPO, Washington, D.C., p. 6.

of this latter type in the first and second years of Title I, it was decided to employ the fixed-grade method in all school districts in the sample.[27]

As described in Part I of this chapter, additional data collection and analysis was conducted by TEMPO under a follow-on contract from HEW (this was called Phase II of the evaluation). This additional work was initiated after the results of Phase I analysis revealed no significant enhancement of achievement accompanied the first one and one-half years of Title I activities, assuming the projects were effective. Two major reasons were advanced of why the Phase I research effort did not actually measure achievement gains: (1) Title I activities might have moderated or leveled out a long-run pattern of declining achievement levels for the disadvantaged groups, or (2) actual associations between exposure to Title I compensatory education projects and achievement changes were masked (or averaged over) by the necessity (by data availability) of limiting the analysis to treating each grade in a sample school as a unit. The primary purpose of Phase II was to investigate the effect of these two factors.

During Phase II, TEMPO went to five of the eleven districts to obtain comprehensive data on achievement trends for the previous

five years and on the actual allocation of regular and Title resources to separate classrooms (or other student subgroups) for which pre- and post-test achievement test data had been studied earlier. Since school districts do not ordinarily maintain cost data at this level, TEMPO had to do extensive allocation of costs based on staff assignments and pupils affected. With this additional, more refined data, TEMPO was able to make adjustments for past trends in a district's achievement trends and carry out a more refined analysis of the associations between achievement changes and various characteristics of schools, pupil, and Title I treatments. The major results and conclusions of Phase I remained unchanged after this additional investigation and analysis.

B. SELECTION OF SITES

As discussed in the preceding section, the data were collected from a non-representative sample of Title I schools. A two-stage sampling plan was used: first, school districts and then a sample of Title I schools at each district were selected. Since this study was exploratory in several regards, it was not considered critical to have a nationally representative sample. It was soon evident that the combination of a six-month study and the necessity for extensive field data collection and test data conversion task for each site meant that a fairly small number of school districts could be included. Earlier hopes had ranged up to 100 districts, but the practical aspects of time and money soon made a target of 15-20 districts more feasible.

As a matter of fact, it would have been very difficult to select a stratified random sample that would have been nationally representative of several relevant Title I characteristics because of the lack of information (at the national level) about specific Title I projects at the early stages of ESEA. For example, it might have been worthwhile to select a variety of types of Title I programs (i.e., reading, teacher training, remedial classes, etc.). But there was no national compilation of local program activities available by individual districts. The same was true of the number of pupils affected by local Title I activities, minority pupils affected, etc. The situation was complicated by the fact that most districts utilized Title I monies for several different activities. Moreover, it was expected that most of the Title I activities would end up being carried out in variance to indications on the advance application or budgets. It is important to remember that this was the first year of a completely new concept of federal assistance and there were still many uncertainties at federal, state, and local levels about how the programs would or should stabilize.

However, within these limitations, it was desired that the sample be representative of the range of values for certain characteristics of school districts so that the analysis could be as applicable as possible. Therefore, the procedures ensured that the sample included a mix of districts (a) from all geographical regions, (b) from urban and nonurban areas, (c) from a range of enrollment sizes, and (d) from both city and county types of local education agencies. In addition, school districts were not included unless DHEW believed they had data available (particularly student pre- and post-test scores in comparable form), and that district personnel would cooperate with TEMPO field investigators. Superimposed on all these criteria was the DHEW desire to have a fair number of successful (or exemplary) compensatory education programs so the reason for their success could be investigated. This latter criteria was also applied, but with difficulty since the state and federal levels had very limited information on actual operations or progress at the local level, and because the selection of districts had to be completed well before the termination of the school year.

Based on these criteria, DHEW and USOE assumed the responsibility of selecting (with the advice of TEMPO) the school districts from which to obtain data for the study. A tentative list of 20 school districts was chosen, with the objective that compensatory education programs would be surveyed in as many of those districts as possible within the time allowed for the study. Extensive visits by joint DHEW-TEMPO teams were made to 14 districts throughout the nation. For reasons of lack of student test data or lack of cooperation, only 11 were used in the data analysis phase. Detailed trip reports on all 14 were provided to DHEW.

During the initial visit to each district, a sample of schools was selected from those eligible for ESEA Title I support in the following manner. Working with the district superintendent (or his staff representative) in each of these districts, all Title I schools were arrayed by the specific pupil, school and compensatory education program attributes noted on page 2, Part II.

From this cross-tabulated list of schools eligible for ESEA Title I support, a sample was chosen to include the desired wide range of values for each of the characteristics. For example, in a given district, several schools were chosen with predominantly Black pupil populations but with different degrees of economic and educational deprivation.

Within a given set of characteristics, selection was made without prior knowledge of the success of compensatory programs at any of the schools within a school district. Table 1 illustrates

the spectrum of characteristics presented in one of the sample districts. A similar diversity of characteristics exists in other districts.

Table 1

CHARACTERISTICS OF SAMPLE ELEMENTARY SCHOOLS IN DISTRICT 4.

School	Student Population (Oct. 1966 ADM)	Percent Black (1966-1967)	Sixth Grade Mean Reading Achievement (Percentile)[c]	Percent of Students Ecomonically Disadvantaged[d]	Years of CE Programs by June 1967
4	1010	99	2	70	1-1/2
6[a]	1617	98	10	60	3+
1[b]	1193	95	8	75	3+
9	411	38	1	85	1-1/2
2	561	15	15	75	7
10	758	94	29	35	1
5	295	24	26	75	1
11	882	19	36	50	1-1/2
7	1330	97	41	35	1
3	541	38	45	45	1
8	661	4	52	35	1

NOTES:
[a]Intensive Teacher Aide Program in addition to Title I Teacher Aides
[b]Special Remediation Program in addition to Title I Remediation Programs.
[c]Percentile rank within District 4, 1964-66.
[d]Family annual incomes $2,000 (1960 census data).
Source: General Electric TEMPO, Survey and Analyses of Results from Title I Funding for Compensatory Education, Santa Barbara, California, General Electric 67 TMP-115, 1967,p.5.

While schools were designated for inclusion in the study, for several reasons, the grade rather than the school as a whole was the unit chosen for analysis in the study. The measures of student performance used are available for specific grades but not for all grades within a school. More important, compensatory programs are not necessarily spread evenly throughout the grades within a school or school system. Aggregating data on the resources and participation in compensatory programs for a whole school or aggregating student performance for a whole school is likely to mask the effects of compensatory education. Therefore, data on pupil performance, descriptions of compensatory programs, and

expenditures for both regular and compensatory programs were gathered by grade for the 132 schools included in the sample.

Of the 150 schools originally selected for inclusion in the sample, 132 contained one or more grades - distributed as shown in Table 2 - for which achievement test data were available for the two academic years in question. The sample includes the test results of 314 school grades for each of the two years. The total number of students in the sample is just under 35,000 for each year.

Table 2

DISTRIBUTION OF THE SCHOOL GRADES USED IN THE ANALYSES OF ACHIEVEMENT TEST RESULTS.

School District	Number of Schools for Grade												Total Grades	Total Schools
	1	2	3	4	5	6	7	8	9	10	11	12		
1				10	17	4	4	4					39	21
2		10	12	12	12	10							56	12
3				15		15		5		1	1	1	38	21
4				11		11		5					27	16
5				14		14							28	14
6			2			2							4	2
8		9	9	9	9	9	3	4			3		55	16
10			9	2	2								13	9
12			4										4	4
13	7	7			7	7		2			2		32	11
14			6	6		6							18	6
Total	7	26	42	79	47	78	7	20	0	1	6	1	314	132

Source: Mosbaek, E.J., and others, Analyses of Compensatory Education in Five School Districts, Volume I, Summary, Aug. 1968, Washington, D.C., General Electric TEMPO, 68 TMP-93 (1), P. 35.

C. ANALYTICAL APPROACH AND MEASURES

This study was intended to provide an estimate of the effectiveness of compensatory education (CE) programs by measuring academic and behavorial changes of students who have been exposed to these compensatory programs. An attempt was made to identify the student, school, and program characteristics that were most highly correlated with such changes as effectiveness. The intent was that if a significant improvement was observed in a group of students, an attempt would be made to describe the group and its environment in socioeconomic terms as well as to

determine what specific activities produced the change. This view allowed for the possibility of an interaction between socioeconomic groups and responsiveness to various programs: a certain program or activity may be highly successful in one group but not in another group of a different socioeconomic character.

Initial study plans included the following measures of enhancement: achievement test scores, attendance rate, drop-out rate, and frequency of disciplinary actions. The effect of CE was to be measured by comparing results on each measure before and after exposure to CE. However, because of time constraints, it became necessary to restrict analysis to achievement test scores and attendance.

The objectives and measures of student performance used in this study are short-range ones; they do not deal with duration of changes nor was an attempt made to follow the student's future performance and earning power or benefits to society. Although these longer-range objectives and associated measures would be more appropriate and revealing as to the productivity of CE programs, such an approach would require a much longer and different kind of study.

One of the key early decisions faced by TEMPO was the selection of a measure of achievement for evaluating CE. Alternative measures for comparison that could be used, as indicated in Figure 4, include:

1. Slope from a to b compared to slope of 1.0 for norm achieving pupil,

2. Achievement level after exposure to CE (b) compared to norm achievement level (d),

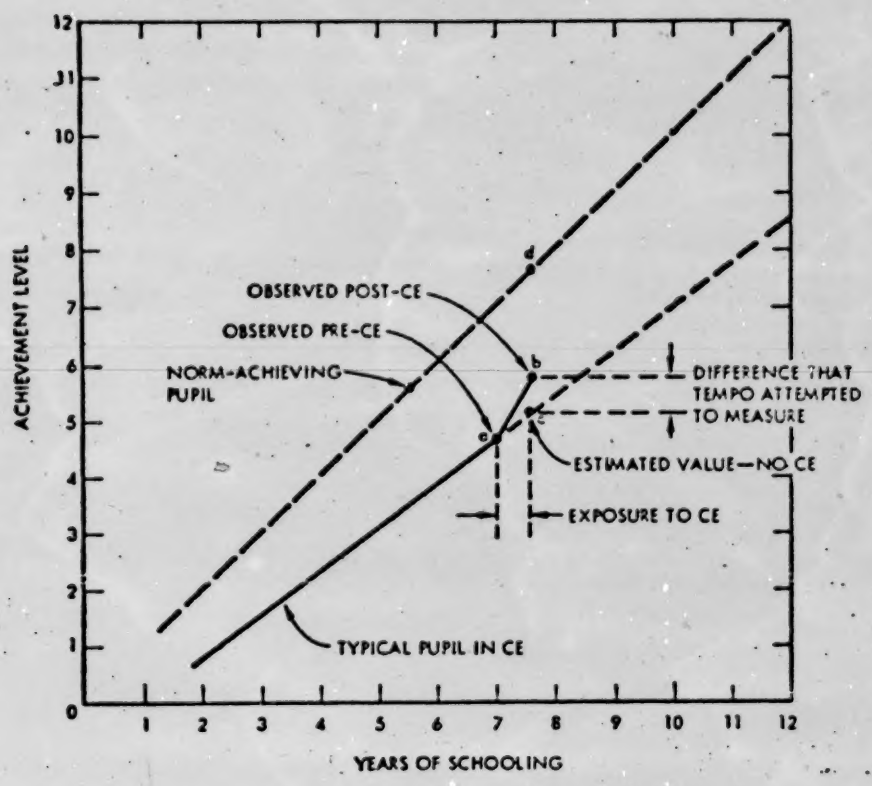
3. Achievement level after exposure to CE (b) compared to an estimate of the potential level of pupil involved,

4. Measurement of the difference between the observed value for (b) and the estimated value of (c) i.e., estimated achievement without CE.[28]

In order to avoid measuring the progress of pupils enrolled in CE activities in terms of the so-called norm-achieving pupil, it was decided to use the fourth measure.

Reading achievement was the only "academic" performance measure chosen to investigate the first study objective concerning the existence of enhanced achievement. Although it may be questionable among some social scientists whether this measure should

Figure 4. Identification of different measures of achievement.



Source: Mosbaek, E. J., and others. Analyses of Compensatory Education in Five School Districts, Vol. I, Summary, Aug. 1968, Washington, D.C., General Electric TEMPO, 68 TMP - 93 (1), p. 35.

be emphasized in a study of this type, reading is a fundamental skill in our society, and one in which disadvantaged children are most noticeably deficient. It is also a skill which affects performance in other academic areas. Although it would have been desirable to consider other academic areas, the time available for this study did not permit this extension.

A variety of characteristics were measured and analyzed to investigate the second study objective. The behavioral characteristics planned for analysis were (1) attendance data (2) rate of dropping out of school, and (3) change in number of disciplinary actions. Attendance rate and change in attendance rate were the only measures for which sufficient data were available. It was found that, in general, these types of behavioral data were not readily available at the school district level and had to be obtained at the schools themselves. Program cost is an important program characteristic worthy of special mention. It was (and has since become even more of) a source of controversy in the achievement of students. The basic viewpoint in defining cost data requirements is the need to relate the real (physical) and money resources of a compensatory education program to measures of effectiveness (student reading achievement). Since both the absolute level and the incremental change in effectiveness resulting from compensatory education were examined, the absolute and incremental compensatory resources and funds were also required. Therefore, the costs of regular school programs before and after compensatory programs as well as the costs of the compensatory programs were required. Cost categories were defined within the context of financial accounting procedures recommended to school districts by the U.S. Office of Education in its Handbook II. Since costs at the individual school (or individual grade) were usually not available, TEMPO had to do considerable cost allocation and estimation. Costs for Title I compensatory education activities had to be related (or allocated) to the specific period between the pre- and post-test measurements (which was often different for each grade studied).

Original plans to obtain data on pupil performance and exposure to CE were expanded to include information on the characteristics of the pupils, their schools, and their communities. The large variation in these later variables was judged as important for explaining observed changes in pupil performance between 1965-66 and 1966-67.

The analysis of achievement test results employed a "fixed-grade" approach in measuring the effects of compensatory programs. The distribution of achievement scores for children in a particular grade and school for the year preceding exposure to compensatory education was compared with the distribution of achievement scores for a different group of children in the same grade and

school in the following year, when compensatory education programs had been implemented. It was assumed that, in the absence of special compensatory programs, the pattern of achievement scores in a grade would remain constant from one year to the next. Thus, changes in the distribution of test scores between the two years would reflect the impact of participation by the students in compensatory programs. The usefulness and validity of the fixed-grade approach were governed by the ability to identify and cope with the additional factors introduced by comparing results for two different sets of pupils. That is, any changes in the achievement pattern from one year to the next must be evaluated in light of normal changes in the level of educational services provided by the school district and changes in the socioeconomic composition of the student population. Either or both of these factors can influence the academic performance from one year to the next of the pupils in a grade.

The most important uncertainty in relying on observed differences in test scores in successive years to assess the effects of compensatory programs arises out of the possibility of trends in achievement scores which are independent of compensatory education. There was reason to expect a downward trend in the achievement level of pupils at inner-city schools (which constitute most of the sample) relative to the entire nation. This decrease in achievement scores for a given grade level over time has been associated with changes in the socioeconomic composition of the student population.

An alternative approach involves the analysis of changes in the achievement test scores of the same students or groups of students through a given time. Longitudinal analyses are attractive because some variables are held constant. In this study, the choice of the fixed-grade approach was dictated by the difficulty in obtaining substantial amounts of longitudinal data. School systems do not as a rule test each grade each year. Further, high pupil mobility, the absence of centrally maintained cumulative records on individual pupils, and the difficulty at the time of the study of linking a pupil's test scores to his participation in particular compensatory programs ruled out the longitudinal approach.

Most of the analyses in this study were based on test data for academic years 1965-66 and 1966-67. The former (1965-66) was considered the "pre" year, or the year prior to compensatory education programs, and the latter (1966-67), the "post" year, or the year in which there had been some exposure to compensatory programs. Although study teams collected information on compensatory programs regardless of the source of funding, the major

infusion of funds resulted from Title I. Funds from Title I did not reach school systems until the spring of 1966, and in many cases the activities sponsored under Title I did not begin until the end of the school year. It was assumed, therefore, that the benefits of compensatory programs would not begin to be evident in achievement test scores until the 1966-67 school year.

Relatively few school systems keep records on the amount and type of compensatory programs in specific grades at a school, nor was it usually possible to identify the specific students within a grade who were participants in compensatory programs. Consequently, it was decided to use test results for all pupils in a grade and to gather information on all grades in the sample schools which had been tested with the same achievement in both 1965-66 and 1966-67.

Various standard analytical and statistical techniques were used in investigating the data collected. When the existence of achievement enhancement was examined using the 314 grade observations (or subsets thereof), it was necessary to also check the statistical significance of the resulting statistics since a sampling process was clearly involved. Comparison with the standard error and the relevant underlying statistical distribution allowed determination of the probability that the observed sample result could have happened by chance. Analysis of variance (and the more discriminating analysis of covariance) was used to test if there were significant differences in observed changes in achievement test scores among school districts. All these analyses were conducted for three measures of change in achievement--the mean, the first decile (10 percent point) and the first quartile (25 percent point) of the distribution of the performance of the grade.

In investigating the association of various school, pupil, and environmental characteristics with enhanced achievement, several additional statistical methods were used. Such a situation is analytically difficult because of the likelihood of joint and interacting actions of many variables. The following three types of analyses were carried out in an attempt to identify the relationships between the variables and the changes in achievement.[29]

- Simple correlations between changes in achievement and each variable were computed from the combined data on all districts and separately from data on each of the 11 districts. This procedure identifies the degree of association between any two variables.

- Analysis of variance was computed for the change at the mean, first decile and first quartile using all 314 observations. The total group was partitioned according to contrasting levels of the variables to estimate the effects of these factors. Analysis of variance is helpful in detecting significant differences among specified sets of results, including groups that cannot be described in numerical terms (such as among districts) and therefore is useful where a correlation coefficient is not applicable.

- Multiple regression analyses were done using a number of variables for which data were available. Multiple regression is helpful for identifying the relative effect of each variable on changes in achievement and is helpful in reducing the sampling variation when testing for significant effect from compensatory education. It is especially helpful when the variable of interest has been affected by many different variables. In constructing a structural model to use for this linear regression analysis, TEMPO postulated that the following five variables were significant in explaining observed change in achievement, and then estimated all the multiple regression coefficients.

  (a) average Title I CE program dollars per student expended by the post-test data for all students in Title I schools in the district

  (b) achievement level at the level at the beginning of Title I programs

  (c) mobility in and out of the school

  (d) percent Black students in a school

  (e) attendance rate in a school.

  The dependent variable, i.e., the one whose variance was being explained in terms of the above five independent variables, was always the observed change in achievement (separate regressions were completed for both the changes at the mean and the first decile.

D. FIELD INVESTIGATIONS

All data were collected through visits by project personnel to the school districts involved. Visits ranging from three days to two weeks in length were made by joint DHEW-TEMPO teams to each of the 14 districts. The original contact with the district and request for data was made by DHEW. The original impetus for such on-site investigations was the shortness of time--(1) there was no time in a six-month study to go through a lengthy survey design process and await mail replies, and (2) the contract starting date of April 1967 left little time to get data from school districts before they closed in May or June. The only practical approach was to establish data requirements (along with operating guidelines) and get professional staff members out into the field very quickly.

Similar field work procedures were utilized in Phase II where additional data for in-depth analyses were obtained from five of the original districts. In the spring of 1968, joint two-person teams from DHEW and TEMPO spent approximately one week at each of the five districts.

No formal survey instruments were developed for use of respondents, since all data collection was by personal visits and interviews. Moreover, the number of school districts and schools was small enough that this aspect of obtaining and handling data was manageable without significant problems. Numerous data collection forms or guides were developed for internal use by field team members to facilitate collection of required information. These identified required data elements so all districts would be described in consistent ways. Although the design of these many forms greatly helped define and structure data requirements, they did not turn out to be as useful as anticipated.

The difference in availability of certain types of data, level of detail, record-keeping systems, and the use of automated records made it difficult to complete these forms for each sample school. They continued as the basic guide for information being sought, but study team members found it more efficient to devise variations which facilitated obtaining data in the several school districts.

In general, it was not necessary to transcribe reading achievement data on to a standard form. These data were obtained from many of the districts in the form of copies of reports or duplicate copies of machine tapes, machine printouts, and handwritten records. Cost and resource data for regular school programs in some instances were automated and in others were transcribed by hand. The annual budgets, annual reports, or

other operating plans were brought back by each field team and often provided an adequate source for cost/resource data. It was soon clear the original applications for Title funding were of little use since actual programs differed so much from submitted project plans, (due to late starts, revised plans, reduced funding, unavailable staff, etc.).

E. ASSEMBLING AND PROCESSING THE DATA

The necessary data on Title I CE programs, student performance, and district characteristics were assembled during the three-day to two-week visits to each district. Undoubtedly more time would have been helpful in every case, but the need to visit many locations in order to expand the sample sizes of schools and programs was considered more important. One negative effect of the intense travel schedule was the inability to summarize and analyze adequately the information and impressions after each trip.

Problems encountered in collecting and processing the information provide insight into the complexity of such a study and are, therefore, useful background information. Briefly stated, the more severe problems were

- the amount of detailed information required for making performance measures compatible was very great and several special conversion factors were required;
- achievement scores came from different tests and from tests which were administered at different points during the school year among and within the sample districts;
- much of the readily available data on compensatory education were not in usable form for study because they did not give information for specific grades;
- it was difficult to distinguish between compensatory education and regular school programs and between compensatory education programs funded by federal and nonfederal agencies;
- the large transfer of pupils into and out of a sample school made it difficult to identify the amount of compensatory education to which pupils had been exposed.

In its Washington Offices, TEMPO processed and analyzed the data it assembled from its field investigations. By far the greatest efforts and problems accompanied the use of achievement tests to measure the change of performance of students exposed to Title I programs. There was no opportunity, time, or money to administer similar or comparable tests for purposes of this evaluation (for example, tests of status before treatment were not possible, since the programs were almost finished before the study started).[30] Therefore, it was necessary to make best possible use of standardized achievement test results already administered by school districts. Utilizing existing test data created other significant problems and requirements which are discussed in the following four sections.

1. Processing Achievement Data

There are two main aspects in obtaining comparable units for observed differences in test scores. One is comparability among different tests and different test dates within an academic year.

The comparability over different achievement levels within a grade was obtained by converting to the Standard T-score.[31] The scale for the Standard T-score has been constructed so that a change from 30 to 35, for example, is comparable to a change from 60 to 65. Comparable in this case means that the amount of effort in CE required to raise the achievement level five points is approximately the same in both cases. As a result, T-scores can be averaged and subjected to statistical analysis, whereas percentile scores, for example, cannot. In some of the analyses, results for different grades were combined, and in these cases it was assumed that differences in T-scores are also among grades. That is, the amount of effort in compensatory education required to increase an achievement level from, say, 30 to 35 in one grade is approximately the same as for a similar movement in other grades.

The second aspect of comparability among different tests and test dates enters through the use of the appropriate publishers' norm tables for computing percentile scores for the testing situations involved. The T-score is obtained by converting the raw score for a specific test to a national percentile rank and then converting the percentile rank to the standard T-score. The assumptions used in computing percentile scores were:

1. Reading, paragraph meaning, and composite subtests measure the same pupil attribute,

2. Publishers' norm populations for each test are similar with respect to the distribution of achievement levels, and,

3. Publishers' norms provide proper adjustment for the time of year at which the test is given.[32]

The first assumption was necessary because each of the three subtests was used in one or more school districts. Since the primary interest was in analyzing differences between pre- and post-test scores, it was not necessary to assume that norm populations were equal in absolute level, but only in the range and distribution over the range.

One feature of the data deserves special notice. Since pupils in eligible Title I schools were theoretically selected for being economically and educationally deprived, their achievement test scores tend to be lower than those of the norm populations. Figure 5 illustrates the distribution of achievement scores of a typical fourth grade in a sample school in 1965-66. Eighty percent of the pupils in this grade received test scores below the mean score of the pupils in the norm population.

The number of pupils in each of the 314 basic observations in each of the years 1965-66 and 1966-67 varied from 16 to 598. This raises the question whether each of the 314 observations should be given the same weight in judging the magnitude and statistical significance of average change in test scores between the two years. If longitudinal data (i.e., test scores for the same pupils in both years) had been used, the obvious choice would be to weight each pupil equally. However, in the "fixed-grade" approach there is no unequivocal way to match individual pupils in 1965-66 with those in 1966-67. The choice was made to present two types of statistics, namely,

1. unweighted averages and standard deviations of the 314 basic observations, and

2. weighted averages of the 314 observations based on number of pupils in each observation.

In general terms, both these situations produced the same results.

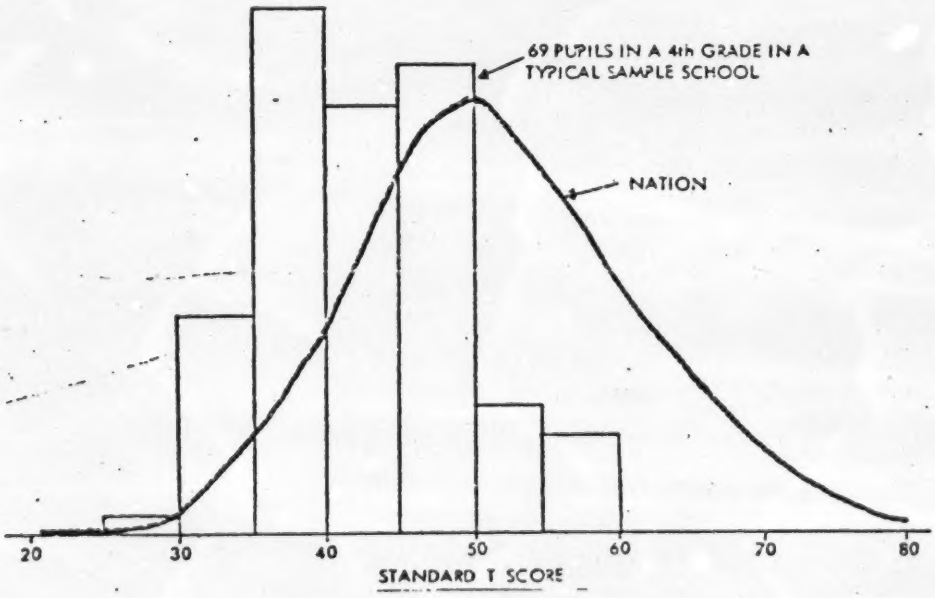
The technical approach called for analyzing each of the 314 observations separately if statistically reliable results could be developed. This would avoid the problems inherent in averaging data from different tests and across different grade levels. It soon became apparent that this approach was not appropriate and data would have to be pooled. First, there is considerable variation in test scores between years that cannot be estimated from available data on the variation among pupils within a year. For example, the test could be given under very good conditions one year and poor conditions the other year.

Second, the sampling variation in test scores was so large that few of the observed differences in pre- and post-test scores for individual observations were statistically significant. Therefore, the scores were all converted to Standard T-socres so that observations could be pooled.

2. Type of Test

Data analysis was limited to standardized achievement tests administered to entire grades of pupils in a school district for each of two years, 1965-66 and 1966-67. In the 11

Figure 5. Distribution of achievement schores in a typical Title I school compared to that for the entire nation.[1]



Source: General Electric TEMPO, Survey and Analyses of Results from Title I Funding for Compensatory Education, Santa Barbara, California, General Electric 67 TMP-115, 1967, p. 19.

school districts, five different tests were used: Stanford Achievement Test (SAT), Metropolitan Achievement Tests (MAT), Iowa Tests of Basic Skills (ITBS), Iowa Tests of Educational Development (ITED), and Sequential Tests of Educational Progress (STEP). The variety of tests and subtests in different grades in the 11 school districts is shown in Table 3.

Table 3

Grade Levels Tested (1965-66 and 1966 67) With Various Achievement Tests and Subtests in 11 Sample School Districts.[1]

School District	Stanford Achievement Tests: Paragraph Meaning	Metropolitan Achievement Tests: Reading	Iowa Tests of Basic Skills: Reading	Iowa Tests of Basic Skills: Composite	Iowa Tests of Educ. Devel.: Ability to Interpret Literary Materials	Iowa Tests of Educ. Devel.: Composite	Sequential Tests of Educ. Progress: Reading
1	4,5.6,7,8						
2	2,3,4,5,6			4,6,8		10, 12	
3							
4			4,6,8				10, 12
5	6	4					
6	3,6						
8		2,3,4,5,6, 7,8,11					
10		3,4,5					
12		3					
13	1,2,6[a],8				11		5
14		3,4,6,8					

NOTE:
[a] Instances in which different editions of the test were used in years 1965-66 and 1966-67.

Source: General Electric TEMPO, Survey and Analyses of Results from Title I Funding for Compensatory Education, Santa Barbara, California, General Electric 67 TMP-115, 1967, p. 21.

There was considerable variation in the time of the year in which tests were given among and even within school districts. This resulted in differences in amounts of compensatory education to which pupils were exposed prior to the 1966-67 test. Such differences in exposure to compensatory education cannot easily be taken into account in a simple comparison of pre- and post-test results, but can be incorporated in the regression analysis.

A new variable was constructed to show what is called "effective Title I dollars" per pupil. This was computed by adding the Title I funds spent in 1965-66 and the fraction of Title I funds for 1966-67 spent up to the time of the 1966-67 achievement tests and dividing the sum by total number of pupils in Title I schools in each district. This new variable was included as one of the determining variables in regression and analysis of covariance.

Differences in test dates between 1965-66 and 1966-67 required use of different norm tables for pre-and post-test or adjustments within a particular norm table.

3. Specific Grades/Students Exposed to Title I Programs

Relatively few school systems keep records on the amount and type of CE programs at specific schools. This means that it was often not possible to identify precisely which grades in a school received Title I programs. Furthermore, it was not possible to identify the specific students in a grade who received CE from Title I programs. Consequently, it was decided to use test scores for an entire grade and to use all grades in Title I designated schools for which test data were available for both 1965-66 and 1966-67.

4. Data Calculations

To aid in the extensive and repetitive processing of the large volume of student test data, TEMPO made use of computer equipment. A time-sharing terminal was installed in the TEMPO offices which allowed continuous connection to a General Electric 235 computer. Programs (written in BASIC) were written to process the test scores and calculate various summary statistics for each grade unit. The many regression and correlation analyses were run in a batch mode on Control Data equipment using the "Biomedical" package of statistical programs.

Data received from school districts were in one of the following forms: class listings of individual pupils, punched cards of individual pupils, computer tab runs by individuals,

and computer printouts of frequency distributions. Test scores included one or more of the following: raw scores, standard scores (for specific type of test), grade (or grade equivalent) scores, percentile scores, and stanines.

All scores not in national percentile were converted to national percentiles by using the appropriate conversion table provided by each test publisher for each separate form of test. Percentile scores were then converted to Standard T-scores. The distribution of Standard T-scores in the population is assumed to be normal with a mean of 50 and a standard deviation of 10. This assumption was utilized in converting national percentiles to Standard T-scores. Detailed conversion tables and examples are contained in the referenced TEMPO reports and the interested reader is referred there for further detail. Figure 3 presents an example of the computer output prepared for each of the 314 grades. Test results for each grade in each school for 1965-66 and 1966-67 were summarized in terms of 19 statistics (see lower part of Figure 6). The central part of Figure 3 illustrates the conversion from raw scores to Standard T-scores. The summary statistics are all in terms of T-scores. The examples show 84 pupils in a grade; in the overall sample, the number of pupils in a grade ranged from 16 to 598.

Figure 6. Example of data processing and summary of statistics on each grade for 1965-66 and 1966-67.

Grade 6, Post Year School
Data in Raw Scores to Run Thru Time-Sharing Computer Statistical Program

41,46,69,105,41,46,68,88,41,46,59,85,85,59,46,41,46,
41,57,85,39,46,57,63,89,56,46,39,38,44,76,54,71,54,
44,36,33,32,44,67,32,33,44,51,66,64,49,42,30,33,33,
42,42,49,47,49,47,64,62,62,51,51,36,39,47,47,46,41,
33,38,42,36,62,62,54,38,32,36,39,38,49,52,30,57

Raw Scores Ranked in Ascending Order:

30	30	30	30	30	30	30	32	32	33	33
33	33	36	36	36	38	38	39	39	39	41
41	41	41	41	41	42	42	42	42	44	44
44	44	46	46	46	46	46	46	46	46	47
47	47	47	49	49	49	49	51	51	51	52
52	54	54	54	56	57	57	57	59	59	60
60	62	62	62	62	64	64	66	67	71	76
80	83	85	85	85	88	105				

Raw Scores Converted to Standard T-Scores and Marked:

26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7
29.5	31.2	31.2	31.2	31.2	31.5	31.5	31.5
34.5	34.5	34.5	34.5	34.5	36.1	36.1	36.1
36.1	36.1	36.1	36.6	36.6	36.6	36.6	36.7
37.1	37.7	37.7	38.3	38.3	38.3	38.3	38.3
38.3	38.0	38.3	39.2	39.2	39.2	39.2	40.8
48.8	40.8	40.8	41.9	41.9	41.9	42.3	42.3
43.6	43.6	43.6	44.2	44.7	44.7	44.7	45.4
45.4	46.4	46.4	47.5	47.5	47.5	47.5	48.1
48.1	50.1	50.5	52.1	54.4	56.4	57.7	58.8
58.8	58.8	59.5	64.8				

Summary Statistics in Standard T-Scores:

Smallest Variate	= 26.7	Number of Variates	= 84
Lower Decile	= 29.5	Arithmetic Mean	= 40.381
First Quartile	= 34.9	Standard Deviation	= 8.52789
Median	= 38.3	Variance	= 72.7113
Third Quartile	= 45.225	Coeff of Van (PCT)	= 21.117
Upper Decile	= 53.25	Standard Skewness	= .623
Largest Variate	= 64.8	Standard Excess	= .181
Total Range	= 38.1		
Decile Range	= 23.75		
Semi-quart Range	= 5.1625		
Bowleys Skewness	= .341		
Pearson Skewness	= .732		

F. RESULTS

This section presents some of the major results of the study. Since the purpose of this publication is to present evaluation approaches and experience rather than to discuss particular substantive content, only highlights of data results are presented. The reader interested expecially in Title I compensatory education per se is referred to the referenced publications for a full discussion.

The TEMPO study involved 35,000 students and 314 grade observations. On the basis of this study certain characteristics of the Title I programs could be ascertained and are important to consider as background for the following discussion of analytical results. Such descriptive information was an important result of this study since previously there was a lack of first hand comparative data on how the districts were actually utilizing Title I funds and what they were accomplishing with this resource.

TEMPO found a wide variety of programs being implemented with Title I funds. Many of the districts had utilized a large amount of their funds to reduce class size or to provide teaching aides; many of the Title I programs were basically benefiting all children in Title I schools without regard to whether the recipients were specifically educationally disadvantaged. In many cases, Title I money was spent on equipment or school construction, especially during the first year of operation. The expenditures per pupil ranged from less than $25.00 to slightly over $225.00; the average expenditure was $40.00 per year. On the basis of 200 school days per year, this is an average of 20 cents per day per child for compensatory education. This type of average expenditure was so minimal that it raises definite questions about the achievement gains which should be expected.

1. Achievement After Compensatory Education:

The results to be discussed first concern the initial objective of the study: whether enhancement of achievement accompanied the extra or compensatory education activities provided by Title I.

Enhancement is defined here as the difference between achievement level after exposure to compensatory education programs and the achievement level which would have been expected in the absence of such programs. While it is possible to measure the achievement level of the same pupils in the absence of compensatory programs had to be estimated at the time of this study.

Table 5. Average change in reading achievement test scores for the total sample.[a]

Achievement Test Statistic	Unweighted Observations[b]			Each Observation Weighted by Sample Size[b]		
	Average Change	Standard Error	Sig. Level[c]	Average Change	Standard Error	Sig. Level[c]
Mean ($\bar{X}$)	- 0.29	0.13	0.05	- 0.40	0.11	0.001
Lowest Decile (D_1)	+ 0.25	0.18	0.20	+ 0.21	0.16	0.20
Lowest Quartile (Q_1)	- 0.30	0.16	0.10	- 0.42	0.14	0.01
Upper Quartile (Q_3)	- 0.48	0.17	0.01	- 0.69	0.15	0.001

Notes:

[a] In units of Standard T-scores and based on observed changes in 314 school-grades in 11 districts.

[b] The unweighted average is computed as $\sum_{i=1}^{314} \frac{1}{314} X_i$ and the weighted average is computed as $\sum_{i=1}^{314} m_i X_i \div \sum_{i=1}^{314} m_i$ where m_i is the average number of pupils who took the pre and post test and X_i is the observed change in the specified statistic.

[c] This is the probability that the observed sample result could have happened by chance if the true change between 1965-66 and 1966-67 was indeed zero.

Source: General Electric TEMPO, Survey and Analyses of Results for Compensatory Education, Santa Barbara, California, General Electric 67 TMP-115, 1967, p. 28.

The results of most of the statistical tests were based on observed (actual) differences in achievement scores between 1965-66 and 1966-67 rather than the estimated (expected) difference between achievement with and without exposure to compensatory programs. The operative assumption was that the distribution of achievement scores should not change from one year to the next (i.e. no adjustment was made in Phase I for possible trends in the level of achievement within a geade).

Although there was no indication of general improvement in the average achievement level of the overall student population in the 314 school grades analyzed, there was a slight improvement in the achievement level of students at the lowest achievement levels (1st decile) in their respective grades as shown in Table 5. Theoretically the Compensatory Education programs should have been focusing on the most seriously disadvantaged students or those with the lowest achievement scores; therefore, there was an expectation of more favorable results for students at the lower achievement levels.

There was a slight decline in achievement at the mean and the first and third quartiles for all of the grade levels in the sample schools. These results suggest that even with compensatory education programs present, there is a slight negative trend in achievement level in schools where Title I money was being concentrated. Table 5 includes results from both weighted and unweighted observations; both approaches lead to the same conclusions.

Several interpretations of study results could be made concerning the positive change in the lowest decile. Even though the positive result was not very large (it represented only about one-fourth of a month in terms of grade equivalent units), it became more significant when contrasted with the negative changes in the mean and at the first and third quartiles. In the absence of special compensatory programs, it would normally be expected that the four statistics would move in the same direction since they were derived from the same distribution of achievement scores. The probability of the observed improvement occurring at the lowest decile and the observed decline at the mean and first and third quartiles would be unlikely by chance alone. Therefore, this could be an indication of a positive effect of compensatory programs if one assumes they are usually concentrated on the lowest achieving students in a grade.

Conversely, it must also be recognized that in some of the sample grade units the test score defining the lowest decile in the first year was equal to the minimum possible score. Thus, in some cases, it was impossible for pupils at the lowest decile to register a lower score the next year, even if a negative change did in fact occur. Therefore, in the fixed-

grade sample studied, the temptation to conjecture that Title I caused the improvement at the lowest decile must be tempered by the need for a corresponding causal explanation of the negative changes in the other statistics. It also must be noted that even though nine of the eleven districts showed a positive change at the lowest decile, as shown in Table 6, only one of these changes was statistically significant at the five per cent confidence level. There appeared to be significant differences among the districts; however, some of the differences seen in Table 6, (such as in the 4.20 change in District 6) can be explained by possible large sampling variation due to the fact that there were only four observations.

The sampling variation for the mean is smaller, and again in Table 6, it is found that three of the 11 districts showed a significant change at the five per cent confidence level. This Table also shows that there are significant differences among the districts when considering the mean. The range between the 1.16 change in the mean for District 13 and the -1.35 change in the mean for District 2 is large. This represents a difference of approximately 2.5 grade equivalent months over a 12 month period.

Longitudinal analyses of individual pupil performance differences were conducted on a much smaller scale. These results were able to be obtained for only one district, but were encouraging and indicated that some Title I programs may have produced significant achievement gains which were obscured by the preponderance of the very general compensatory education projects or by the fixed-grade method of analysis. However, utilizing a longitudinal method of analysis rather than fixed grade with a Title I project which provided a librarian or audio visual eqipment for a whole school or grade, would not have been meaningful. Within the district where longitudinal analysis was possible, it appeared that the gap between the educationally disadvantaged pupil and the norm achieving pupil was being substantially narrowed. The compensatory reading program involving 790 students was studied utilizing the longitudinal technique. It was expected that the students in this program would achieve .7 of a year per year of school; however, the actual achievement increase for students in this program was 1.4 years in a school year. It is important to note that another Title I program which was studied utilizing the longitudinal method of anlaysis and where the expenditures were in excess of the compensatory reading program above did not show positive or unexpected increases in achievement.

As previously described, subsequent additional investigation (called Phase II) was authorized by the Office of Education in order to determine whether further refinement of the Title I data in Phase I of this study would produce results in

Table 6. Average change in mean reading test scores by district.

School District	No. of Grades Observed	Average Change in Mean[a]	Average Change in Lowest Decile[a]
1	39	+0.25	+0.05
2	56	-1.35[b]	+0.04
3	42	-0.34	+0.22
4	27	-1.03[b]	-0.68
5	28	-0.16	-0.70
6	4	+1.28	+4.20
8	55	-0.37	+0.26
10	13	-0.21	+0.55
12	4	+0.42	+1.78
13	32	+1.16[b]	+1.32[b]
14	18	+0.01	+0.04

Notes:

[a]In units of Standard T-scores.

[b]Statistically significant at the 5 percent confidence level.

Source: Mosbaek, E. J., and others, Analyses of Compensatory Education in Five School Districts, Volume I, Summary, August 1968, Washington, D.C., General Electric TEMPO, 68 TMP-93 (1), p. 38.

variance or more refined than those found there. This further study involved five out of the original 11 districts and included data on 60 other schools and 6,500 pupils. This subsample cannot be considered a random or a stratified random sample because the districts were selected on availability of specific data, particularly achievement and financial data.

One factor particularly investigated in Phase II was the effect of negative trend in student achievement upon the results of Phase I. The existance of declining levels of achievement in schools with many disadvantaged students (particularly inner city schools) had often been claimed or hypothesized. If such was true in the schools studied by TEMPO, the lack of achievement gain associated with new Title I programs might not be so surprising. In fact the programs could be considered successful if they significantly reduced a several-year declining achievement trend, even if this trend was not actually reversed. Therefore, during the intensive Phase II field work in five school districts, TEMPO obtained achievement data for the four years prior to Title I for the grade units previously studied. The data obtained by that study did not present a consistent picture on trend, partly because sampling variation from year to year was much larger than any trend factor that might be operative at the school level, (i.e., trends varied greatly among grades, among schools and among districts.) But, it is significant that the data analyzed (from the 60 schools in five school districts) did not confirm the expectations of negative trend based upon the results of Phase I and the socio-economic trends involved. As a result, no adjustments were made to the observed data and TEMPO did not make further use of these concepts.

2. Characteristics Analyzed in Relation to Achievement.

The second objective of the study was to determine what characteristics of the pupils, the schools and the compensatory programs were associated with changes in pupil performance. The particular variables chosen for examination were grade level, degree of economic deprivation, student mobility, proportion of black pupils in the school in the 1965-66 school year, change in black enrollment, proportion of Spanish speaking students in the school during the 1965-66 school year, mean reading achievement level in the school in 1965-66, change in rate of attendance from 1965-66 to 1966-67, size of school and size of grade. Statistical methods of regression analysis and analysis of variance were used to judge to what degree these characteristics could account for the difference in observed pupil performance.

Most of the results from this analysis were inconclusive, probably because of the overall lack of significant performance gain in the observed data. The regression analysis revealed no statistically significant relationship between reading achievement changes and the characteristics of mobility of pupils, school size, grade size, degree of economic deprivation, grade level or attendance rate. There was a definite, but weak, nonlinear relationship between changes in achievement between 1965-66 and 1966-67 and the proportion of black students in a school.

The above pupil, school and program characteristics have been suggested by many as important factors in achievement in the educational setting. It is important to examine here the logic from the TEMPO study so that the student of research can note the reasoning behind the selection of these variables and the specific results of the various analyses.

For example, educators and social science research personnel have felt that there may be critical grade levels in the normal 12 years of public education during which it is relatively easy to compensate for the effects of educational deprivation and other grade levels when it is relatively difficult. If educationally disadvantaged children are given special help at the appropriate grade level, they may be able to overcome most, if not all, of their disadvantages. It has been generally accepted that the early grades are the most important levels for such intervention. It is important to note that in this study (one of the few to cover many grade levels) the results of several different analyses provided no evidence that changes in achievement were related to grade level.

The main criterion for selection of schools to participate in Title I of the ESEA is a high concentration of children from low income families in the specific school attendance area. Although the law specifies how this Title I money is to be allocated on the basis of economic guidelines, the standards used by local school districts to determine eligible schools vary greatly from district ot district. Each school in this study was classified as being high, medium or low in terms of economic deprivation relative to all Title I schools in that district. None of the analyses performed indicated any reliable relationships between degree of economic deprivation and changes in achievement.

High student mobility was deemed likely to have an adverse effect on compensatory education for several reasons. First, the range of compensatory programs varies from school to school, therefore a student who transfers from one school to another may not be able to continue in the same type of compensatory program. Secondly, the disruption caused by transferring

may have an undesirable effect on the student's overall academic performance. Moreover, high rates of mobility make it difficult to assess the effectiveness of compensatory programs at a school since many of the students taking a posttest may have had very little exposure to the compensatory programs in the school in which they are being tested. The results of the analyses performed gave inconclusive evidence for the effects of mobility on changes in achievement. Two of the analyses yielded opposing results on the possible negative effect of high mobility. This might have been caused by mobility being correlated with other variables which also influence changes in achievement.

Analyses were utilized to determine the effects on achievement on the proportion of black students in a school and on the change in enrollment of black students in a school. There appeared to be a nonlinear relationship between changes in achievement between 1965-66 and 1966-67 and the proportion of black students in a school. Of the 132 schools in the sample, those with relatively low black enrollments (less than 20 per cent) tended to show statistically significant positive changes in achievement at the mean, the first quartile and the first decile. The group of sample schools in the 40-59 per cent black category showed statistically significant negative changes in achievement at the mean and at the first quartile. Since there was considerable variation in racial composition among the sample districts, it might be thought that these results simply reflect difference among districts. However, further statistical tests indicated that the relationship between changes in achievement and percentage of black enrollment is similar within each of the districts.

In the area of Black enrollment, there were 26 of the sample schools which changed five per cent or more between 1965-66 and 1966-67. Within the 26 schools there were 53 school-grade observations, 41 of which increased in percentage of black students and 12 of which decreased. Changes in achievement test scores at the mean and first decile for these school grades indicated that relatively large changes in percentage of black students in either direction are associated with less favorable changes in achievement.

The proportions of Spanish-speaking students in school districts was also utilized to investigate relationships to achievement. Several of the districts in the sample had relatively large proportions of Spanish speaking pupils, but the analysis did not reveal any significance between their enrollment and change in achievement. These results were not decisive, however, since the statistical tests were necessarily based on a small subsample, and there was little variation in percentage of Spanish speaking students among schools within each district.

Attendance is assumed to be important in school achievement and is also assumed to vary with pupils' motivation to learn. For the sample as a whole, there was a small positive correlation between rate of attendance and change in achievement. In the area of attendance and its relationship to motivation to learn, increasing rates of attendance might be positively associated with change in achievement; however, correlations computed from the data showed no clear relationship between these two variables. The available measures of change in attendance were crude, since the definition of attendance differed among the sample districts, and there were no controls for other factors (such as weather or illness) which might have affected attendance rates.

Recently there have been theories which propose that the achievement of students is related to the size of the school or the grade. Some educators feel that there is an optimum size which promotes better achievement. The statistical evidence in this study showed no significant relationship between changes in achievement and the number of pupils in a grade or the size of the school.

Although the main focus of this study was on changes in achievement test scores and the relationship between those changes and selected pupil-school-environmental variables, it was possible to make a preliminary examination of the effects from different levels of expenditure for compensatory programs on achievement. This was done by inclusion in regression analyses of a variable indicating average Title I expenditure per pupil in each sample district.

In order to relate expenditures to achievement test results, a new variable, "effective Title I dollars per pupil," was created. For each sample observation this variable was computed as the sum of average Title I dollars per pupil in 1965-66 plus a portion of the average Title I dollars per pupil in 1966-67. The portion used for 1966-67 was based on the fraction of the academic year which had elapsed up to the date of the 1966-67 test for each specific grade unit. This variable did not take into account any funds other than Title I which might have been expended by the school district for compensatory programs.

For the 11 districts having data available, there was a positive correlation between effective Title I dollars per pupil and changes in achievement test scores. The correlation was statistically significant at the five per cent level for each of the four measures of achievement: change in the mean, change in the first decile, and changes in the first and third quartiles.

At the level of specific school districts, there also seemed to be a congruence between changes in achievement test scores and effective Title I dollars per pupil. The three districts with the highest level of Title I funding had the largest gains in achievement at the first decile.

These positive findings should be regarded as a very crude attempt to determine the overall relation between level of funding and achievement change. The findings were based on highly aggregated data which did not give a true picture of what is happening at the grade level. Analyses of achievement change indicated that not only was there great variation in performance among districts, but also great variation among schools within a district and even among grades within the same school.

The Phase II study considered the relationship between changes in achievement and the kinds and costs of compensatory programs at the grade level within sample schools in five districts. This more detailed examination increased the understanding of each of the five case studies, but the small numbers involved introduced too much sampling variation to allow generalizations.

A large number of other more minor questions and hypotheses were also investigated using the data collected by TEMPO. While the available data did not provide conclusive results in most of these areas, the referenced TEMPO reports discuss the analyses and results in detail.

G. POSTSCRIPT FOR THE RESEARCHER

Potential and practicing researchers in the social sciences will draw a variety of lessons from the actual experiences described in this chapter. One thing is certain, Title I as the largest Federal Educational aid effort in this country deserves the best and the most sophisticated evaluation efforts possible. The TEMPO study just described was an early attempt in that direction. There continues to be a need to be wary of such meaningless statements as are found in the National Advisory Council Report for 1972. This report concludes with the statements: "The Council's investigation in 1968 indicated that about one-quarter of the programs then were bringing results. Today, the estimate is that more than one-third of the Title I programs are facilitating the education of disadvantaged children."[32] To the educational researcher and policy maker, such statements quickly beg for specifics--what kind of results, positive or negative, from where would the results come, (since there were not studies yielding hard data which could produce that type of definite conclusion). Is the goal of Title I to facilitate, i.e., to make easy or less difficult? Is easy good or bad?

What evidence or data was used to determine facilitation of education for the disadvantaged?

The professional educational researcher must demand from the federal government, the state and the local educational agency the right to use a research design and tools which can give policy makers, consumers and citizens specific answers and data about the progress of the disadvantaged child in the American Educational system. The educational researcher must remember the purpose of Title I was to help the disadvantaged student, not to glorify teachers nor to create jobs for policy-makers or administrators. With this in mind the educational researcher must raise specific questions; he must use the best research tools available for his task; he must never be satisfied with a subjective response to a question such as "Is Johnny reading better after his 10 months in the Title I remedial reading program?" He must be able to determine this on the basis of reliable and valid measures which have been accurately administered. He must be able to defend the representativeness of his sample, the cost-benefit procedures used, etc. He must do this in order that present programs and procedures can be improved so that the future Johnny's who are educationally disadvantaged can be worked with on the basis of enlightenment instead of "more of the same" or random experimentation. All of our policy making bodies administrators and citizens owe this to the consumers of education--students.

FOOTNOTES

[1]This study was funded by contracts HEW-05-67-55 and OEC-0-8-080462-3513(010) from DHEW and OE respectively. Nevertheless, the conclusions of this article are those of the authors and may not necessarily represent those of TEMPO, DHEW, or OE.

[2]While Dr. Kenneth Gordon was a member of the TEMPO team during the analytical, report writing, and case study phases of the projects, several other people were involved for even longer periods. All project staff contributed to the TEMPO reports describing the project results, parts of which have been used in this summary article. Dr. Harold Asher, Manager of the Washington office of TEMPO, was responsible for the original conceptualization of the study and provided general management supervision throughout. Dr. Joseph W. Harrison was responsible for the early design and data collection phases and Dr. Ernest Mosbaek was responsible for the later phases of data analysis and report writing. Mr. Ronald Frola, Mr. D. Stephen Mayer, and Dr. Charles W. Windle were heavily involved in field data collection and data analysis activities. Mr. Mark Adler coordinated the processing of the extensive student achievement test data. TEMPO was also greatly aided during this study by Dr. Alice Rivlin and Dr. Joseph Wholey of the DHEW Program Analysis Group, who successively exercised technical monitoring responsibility over the TEMPO contracts.

[3]Survey and Analyses of Results From Title I Funding for Compensatory Education, (Santa Barbara, California; TEMPO, General Electric Company Report 67TMP-115, 1968).

[4]Analysis of Compensatory Education in Five School Districts (2 Volumes); (Santa Barbara, California; TEMPO, General Electric Company Report 68TMP-93, 1968).

[5]United States Supreme Court decision, Brown vs. Board of Education of Topeka, Kansas, 1954. This decision overturned the Plessy vs. Ferguson ruling that racial segregation was permissible if schools were separate but equal. The 1954 decision indicated that separate but equal has no place in the U.S. system.

[6]Bailey, S. K., and Mosher, Edith K., ESEA- The Office of Education Administers a Law; (Syracuse, New York; Syracuse University Press, 1968): p. 2. For the social science researcher who desires to know more about the forces at work at the time of the passage of ESEA, the authors of this text offer thorough discussions of the political, social and religious influences

coupled with the realities of the perceived importance (by Congress and the Executive Area) of the Office of Education, pp. 1-36.

[7]The Smith Hughes Vocational Act of 1917 was evidence of one of the first entries into educational financing for the federal government. It created a partnership between the local, state and federal governments for the purpose of preparing students for employment. It was not until the Vocational Amendments of 1963 (followed by the Amendments of 1969) that the Federal Government significantly restructured their role in vocational education. The beginning of Federal Government financing of educational programs in 1917 was followed by a nearly total absence of additional program funding until the post World War II period. Federal expenditures have gone from 7 million in 1917 to the 500 millions at the present time for vocational education.

[8]In response to post-Sputnik concern about our scientific and research manpower capabilities, Congress enacted the National Defense Education Act of 1958 providing federal financial support to increase the quantity and quality of our engineers, scientists and foreign language specialists. This financial support was for both secondary school and higher education programs.

[9]The Cooperative Research Act was passed in 1954. This Act had its basis in the premise that the scientific method applied to education would equal improvement. In 1965 this entry by the Federal Government into the educational research field was expanded into Title IV, ESEA resulting in the funding of 12 regional educational laboratories (which generally emphasized developmental research) and 8 university-based R & D centers (emphasizing basic research).

[10]The Elementary and Secondary Education Act of 1965 was composed of five main Titles. Approximately 83% of the total funds authorized for ESEA went into Title I, Better Schooling for Educationally Deprived Children The remainder of the Titles, while not specifically concerned with the disadvantaged, would theoretically bring improvements to the educational system and, in turn, benefit those children who suffer educational handicaps. Title II provided grants for the acquisition of school library resources, textbooks, and other printed and published materials; Title III provided funding on a competitive basis for supplementary educational services and centers in order to stimulate exemplary programs which could serve as models; Title IV (noted above) and Title V which provided funding to strengthen state departments of education.

[11]History of Title I, ESEA, (Department of Health, Education, and Welfare, Office of Education, 1972). p. 3.

[12]For example, in FY 1968 36.1% of expenditures were for reading projects, 5.6% for library, 5.1% for counseling and guidance, and 3.7% for mathematics instruction.

[13]Coleman, James, et al., Equality of Educational Opportunity, (U.S. Office of Education, GPO, July 1966).

[14]Section 402 of the Civil Rights Act of 1964 stated The Commissioner of Education shall conduct a survey and make a report to the President and the Congress, within two years of the enactment of the title, concerning the lack of availability of equal educational opportunities for individuals by reason of race, color, religion or national origin in public educational institutions at all levels in the United States, its territories and possessions, and the District of Columbia.

[15]Op. cit.

[16]The nearing deadlines for some of these review cycles were the reason for the original tight schedule for the present study, which later had to be stretched out somewhat.

[17]This was the same organization that later was upgraded to Assistant Secretary for Program Analysis and even later became the current Assistant Secretary for Planning and Evaluation (ASPE).

[18]Remember, this was during the first two years of a whole new federal approach to helping local districts with their compensatory education needs. It did become more common to encounter concern and possible hostility from program staff that felt threatened by outside evaluations during the evaluations of specific federal programs that came several years after this project. This was particularly true when either the existence or technical approach of federal assistance programs was very controversial or under pressure, either in the political or educational sectors. It was not until after the TEMPO evaluation (perhaps influenced by its lack of positive results) that Title I became heavily criticized.

[19]See pp. II 4,5 of this chapter for explanation if "Fixed Grade" and Longitudinal" as utilized in this specific study.

[20]Since the demand for evaluation across programs and across school districts has intensified in recent years, the

Office of Education has sponsored the development of criterion referenced tests like the National Assessment of Educational Progress. This program is being carried out by the Education Commission of the States under contract to the U.S. Office of Education. The testing in this project was begun in 1969 and reports are now available on science, citizenship, reading, literature and social studies. Contact Dr. J. Stanley Ahman, Director, 1860 Lincoln Street, Denver, Colorado 80203 for further information. The Office of Education is also supporting the National Anchor Test Project aimed at improved cross norming of similar achievement tests which would enable the educational reseacher to compare a variety of achievement test results. For further information about this project being conducted by Educational Testing Service, Princeton, New Jersey, contact project monitor Charles Hammer, Bureau of Educational Statistics, Office of Education, Washington, D. C. No date is currently set for completion of the project and no publications are available at this time. Alternatively, several exploratory research or program evaluation projects have designed and administered special performance tests, such as for the equality of education study (Coleman Study) and several longitudinal studies currently being conducted. In each case, funds many times over those committed to this TEMPO study were needed.

[21]California State Department of Education, Evaluation of Title I Projects of California Schools, Annual Report 1967-68, Sacramento, 1968.

[22]California State Department of Education, Evaluation of ESEA Title I Projects of California Schools, Annual Report 70-71, Sacramento, 1972.

[23]Education of the Disadvantaged; An Evaluation Report on Title I, Elementary and Secondary Education Act of 1965; FY 1968, Washington: (U.S. Department of Health, Education and Welfare, Office of Education; U.S. Government Printing Office, April 1970).

[24]Students of educational research may want to review this study for the socio-economic information which is summarized for program participants and for the discussion of teacher assessment of the disadvantaged child and the relation of achievement to this assessment.

[25]Gordon, K. F; Gordon, B.; and Frola, R.; Evaluation of Title I ESEA Compensatory Education, March 1971, 71TMP23, General Electric TEMPO, Washington, D. C., p. 4.

[26]Ibid, p. 5.

[27]Ibid., p. 7.

[28]Ibid., p. 8.

[29]Additional information on these methods can be obtained in most standard testbooks on statistics.

[30]Some other evaluation studies by USOE have included the administration of special achievement tests, noteably the 1965 Coleman Study (Equality of Educational Opportunity), and the 1972 study of the effectiveness of Compensatory Education. Each was funded at over a million dollars.

[31]The following definitions help clarify necessary technical terms:

Grade score, Grade Equivalent or GE - Scores reflecting the grade placement of pupils for whom the given score is the average of norm.

Percentile score - A score or rank indicating the percentage of pupils in the standardization group at the given grade placement having scores less than the given score.

Raw score - The number of correct answers in a test.

Standard T-score - A score representing the placement of the individual in a norm population of normally distributed scores around a mean of 50 and standard deviation of 10.

[32]National Advisory Council on the Education of Disadvantaged Children; Annual Report to the President and the Congress, 1972-Educating the Disadvantaged Child: Where We Stand; Washington, D.C.; DHEW Pub. No. (OE) 72-121, 1972.

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